

A.3.8 LIVING WITH A STAR GEOSPACE INSTRUMENT DEVELOPMENT

1. Scope of Program

The Living With a Star (LWS) Geospace Instrument Development (GID) program supports the advancement of spacecraft-based instrument technology that shows promise for use in scientific investigations on the future LWS Geospace Missions Network program (see further in Section 2 below). The goal of the program is to develop scientific instruments or components of such instruments to the point where technologically mature instrument science investigations may be proposed in response to the anticipated future announcements of flight opportunity for the Geospace Missions Network without additional technology development or significant design effort. The proposed instrument technology through this LWS GID program must address specific scientific objectives of LWS Geospace Missions Network. Methods to significantly improve the performance of existing types of instruments and/or that enable integrated instrument packaging that minimizes the demand for spacecraft resources may be proposed and are especially encouraged. New measurement techniques and/or the development of technologies that enable integrated instrument packaging may be proposed only if it can be demonstrated that a path to flight readiness of less than two years exists.

Instrument development can take place at several stages, from laboratory breadboarding of critical components and complete instruments, to prototyping (but not construction) of flight hardware. Particularly, for very complex instruments, proposers initially may choose to develop only the most risky components. However, in all cases of component-only development, one or more likely scenarios for possible follow-on instrument development must be described. For all (instrument or component) proposals, the scientific objectives of those instruments and likely candidate missions must be discussed in the proposal; instrument and/or technology developments proposed in the absence of discussion of how these studies could be used to attack contemporary issues in the LWS Geospace Missions Network context will be considered nonresponsive to this solicitation.

Specifically excluded from this solicitation are proposals for the development of new instruments for missions already selected for flight or selected for Explorer Phase A study and/or development, as well as those for the development of new instruments for Solar Terrestrial Probe missions, the LWS Solar Dynamics Observatory (SDO) mission, or Solar Sentinels.

2. LWS Geospace Missions Network

Living With a Star (LWS) is a research program targeted to understand the cause-and-effect relationships between events at the Sun and their on life on Earth and humanity's technological systems (reference <http://lws.gsfc.nasa.gov/>). The mission categories envisioned for LWS include the Solar Dynamics Observatory (SDO), a Geospace Missions Network, and the Solar Sentinels.

The LWS Geospace Missions Network is the primary component of the Geospace portion of LWS, whose goal is to conduct the research required to accomplish the LWS objective of understanding the response of geospace to solar variability and its impact on society. The Geospace Missions Network is envisioned as consisting of several dedicated NASA spacecraft located in key geospace regions; namely the ionosphere/thermosphere and radiation belts. Possible scenarios include *in situ* measurements with multiple spacecraft in geo-transfer orbits, spacecraft in different inclination low-Earth orbits, and a high-inclination elliptical remote sensing spacecraft. To achieve the LWS goals, the Geospace Missions Network is intended to fly concurrently with other LWS missions, in particular the SDO, so that the response of geospace is characterized as a function of well specified variable solar energy inputs.

To gain an understanding and develop a characterization of the ionospheric and thermospheric phenomena of priority to LWS, measurements of the neutral and plasma densities, compositions, and temperatures, along with precipitating particles and electric and magnetic fields over the frequency domains of interest in the region are required. To gain an understanding of the radiation belts, plasma measurements are required of the phase space distributions of the radiation belt particles and the electric and magnetic fields over the frequency domains of interest to these particles. To enable an understanding of the response of geospace to solar variability and to provide contextual information to *in situ* observations, measurements of the global aurora characteristic energy and morphology are required, as well as spatial distribution and composition of the ring current.

3. Programmatic Information

Proposals are solicited under this NRA for instrument development only for the missions or classes of missions described in Section 2 above. All proposals submitted to the LWS GIDP program must specify the science objectives of the proposed instrumentation. The relationship between the science objectives and the instrumental capabilities must be clearly demonstrated. For those instruments applicable to many missions or capable of meeting multiple science objectives, examples of science objectives for the proposed mission or missions should be given. In addition, proposals should clearly demonstrate what technical advances would result (e.g. instrument sensitivity, resource requirements, survivability) and what new science might be enabled relative to current instrumentation, if funded.

It is anticipated that the scientific payloads on most future LWS Geospace Missions Network will be limited to small, low mass, low power, and low cost instruments. For this reason, proposals for instrument development satisfying these general specifications are especially encouraged.

The evaluation criteria in the *NASA Guidebook for Proposers* are fully applicable to the LWS GIDP, including evaluation of scientific and technical merit, relevance to NASA's objectives, and cost. However, it should be noted that the contemplated sequence of

missions described in this NRA is a best current estimate and is subject to change. Therefore, NASA reserves the right to make a determination of relevance based on the contemplated sequence of missions, as it is understood at the time of proposal evaluation and selection.

Proposals may specify periods of performance of up to two years. It is expected that there will be approximately \$2M available in FY 2002 for the support of up to 10 proposals.

IMPORTANT INFORMATION

As discussed in the *Summary of Solicitation* of this NRA, the Office of Space Science (OSS) is now using a single, unified set of instructions for the submission of proposals. This material is contained in the document entitled *NASA Guidebook for Proposers Responding to NASA Research Announcement – 2001* (or *NASA Guidebook for Proposers* for short) that is accessible by opening URL <http://research.hq.nasa.gov>, and linking through the menu item "Helpful References," or may be directly accessed online at URL <http://www.hq.nasa.gov/office/procurement/nraguidebook/>. This NRA's Summary of Solicitation also contains the schedule and instructions for the electronic submission of a *Notice of Intent* (NOI) to propose and a proposal's *Cover Page/Proposal Summary*, which now also includes the required *Budget Summary*, and the mailing address for the submission of a proposal.

As a modification to the default specification in the *Summary of Solicitation* of this NRA, 18 copies of the proposal are required, plus the signed original.

Questions about this program element may be directed to either of the cognizant Discipline Scientists:

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